

AN ANNOTATED LIST OF THE CICADAS OF VIRGINIA WITH DESCRIPTION OF A NEW SPECIES.

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The discovery of a new species of cicada in Virginia in 1921 has seemed a sufficient reason for presenting this list, though the records from the state are not very numerous. It is believed, however, that all of the species occurring in the state have probably been included, even though extended records of captures are lacking. A table for the determination of the species is presented, based on the Key to the Cicadas of the Southeastern United States, published in this JOURNAL in 1918.

Through the kindness of Colonel Wirt Robinson, of West Point, the writer has on several occasions had the opportunity of investigating the cicadas and other insects to be found about Wingina, Nelson County, Virginia, one hundred and four miles up the James River from Richmond. Here the colonel spends his summers, not far from where he was born, and here also he has a well-ordered museum containing many mammals, birds and insects, as well as Indian implements, from the vicinity and elsewhere. The woods containing wild turkeys, bunnies, rattlesnakes and their next of kin are close to the house, and one may make observations of interest from the porch of the museum itself. Our first excursion afield in 1921, among these interesting surroundings, was on the afternoon of August 2, when we visited the woods composed mostly of oaks and pines close to the museum building. Directly the writer heard a slow *zapc, zapc, zapc*, repeated about 40 to 45 times a minute, and continued for about one or two minutes. This was altogether a new song and suggested the performance of an Orthopterous insect, but as the colonel said he had heard it on other occasions and supposed it a cicada, our interest in the matter was intensified. If it were a cicada, it was probably a new one, as no other species known to the writer had a song like the one to which we had been listening. We had not long to wait, for soon a cicada about the size of *linnei* was seen on a limb, slowly lifting and lowering its abdomen, and each time it did so it uttered a *zapc*. If very near we

could hear a few ticks in between the zapes, the song somewhat resembling the much shorter performance, the *z-zape*, of *Tibicen pruinosus* var. *winnemanna* of the same locality. It was obvious that this cicada was very much of a tall-tree loving species, and so the next day the colonel loaded a number of shells with small charges of powder and shot, and very skillfully brought down the first representative I had seen of a new species, which it affords me great pleasure to name in his honor. He has known of the insect from his boyhood days, but somehow it has thus far escaped getting a name.

There were six additional species singing about the house and museum, or in the near-by woods. They were: *Tibicen pruinosus* var. *winnemanna*, *T. linnei*, *T. davisi*, *T. lyricen*, *T. sayi* and *T. auletes*. In the mornings *sayi* was the first cicada to sing, and rarely did we hear a *winnemanna*. *Tibicen linnei*, *T. lyricen* and *T. auletes* sang off and on during the day. There was a lull—a time of rest—in the afternoon, after which *winnemanna* commenced to sing its *z-zape* song. About 7 P.M. *auletes* joined in, as did *lyricen*, until all three species produced a continuous cicada chorus in the trees about the house. This would continue until after dark. Only once did we hear a *linnei* near the house; it is found more in the woods among the forest trees where there are moist bottom lands, and *davisi* is a frequenter of the pines. Also about dark the household cats came forth to catch the cicada pupæ that crawled slowly to the trunks of the trees, and ascended if they could escape the aforesaid-mentioned cats and several fat toads that lay in wait for them. We also were among their enemies, and on several occasions collecting a number, placed them on the wire screens in the windows of the museum, where they developed. All we collected were *winnemanna*, except one, which proved to be a female *lyricen*.

Additional notes on each species will be found on the succeeding pages; also acknowledgments are there made to various persons who have aided with specimens. Special thanks, however, are due to Dr. Henry Fox, who, while stationed at Tappahannock in 1915 and 1916, either personally collected or caused to be collected a great many cicadas which he kindly presented to the writer. The specimens mentioned on the following pages are in the writer's collection unless otherwise stated.

KEY TO THE GENERA OF VIRGINIA CICADAS.

(Okanagana is included as it may occur in the mountains.)

Tympanal coverings concealing tympanal orifices.

Head large and broad; body walls of abdomen thickened; opercula

large **Tibicen** Latreille.

Head small; abdomen translucent; opercula very small.

Cicada Linnaeus.

Tympanal coverings absent.

Cells of median area of fore wings (ulnar cells) longer than marginal cells; median and cubitus veins of fore wings not united but reaching basal cell or arculus separately.

Uncus retractile within abdomen of male; opercula rather large, nearly touching on inner margin..... **Tibicina** Kolenati.Uncus not retractile within abdomen of male but exposed; opercula small with extremities far apart..... **Okanagana** Distant.Cells of median area of fore wings (ulnar cells) of about the same length or shorter than marginal cells; median and cubitus veins united near base of fore wing and reaching the basal cell or arculus as a single vein. Very small species..... **Melampsalta** Kolenati.KEY TO THE SPECIES OF THE GENUS **TIBICEN** FOUND IN VIRGINIA.

A. Large, heavy-bodied species; head broad, uncus simple, and first cross vein in the fore wings starting from radius 3 far back, or about one third distant from base of first marginal cell.

B. Uncus longer than broad. Black species with green or greenish markings and black area on the central part of the abdomen beneath, except in *sayi*.

C. Hind margin of pronotum or collar green or greenish.

Dorsum of abdomen with the hind margin of the segments more or less brown and generally but a trace of a pruinose stripe each side on segment three; a narrow irregular area of black on the under side of abdomen; opercula short and broad, obliquely truncated on the inner side. Expands about 95 mm..... **pruinosa** var. **winnemanna** (Davis).

Dorsum of abdomen shining black with a broad pruinose mark each side on segment three; blackened area on under side of abdomen more in the nature of an even stripe. Found near the coast. Expands about 95 mm.

pruinosa var. **latifasciata** (Davis).

Dorsum of abdomen shining black without any white stripe each side on segment three; blackened area on under side of abdomen a distinct shining stripe; extremities of opercula

broadly and evenly rounded; obliquely truncated but slightly on the inner side. Expands about 90 mm.

robinsoniana new species.

Dorsum of abdomen shining black usually with a small white spot each side at base of segment three; blackened area on the under side of the abdomen a distinct shining stripe; extremities of the opercula obliquely truncated on the inner side. Margin of the front wings suddenly bent near the middle. Expands about 90 mm...*linnei* (Smith & Grossbeck).

A definite longitudinal band of black on the under side of the abdomen; head with the front rather prominent. A rather small species. Expands about 72 mm.

canicularis (Harris).

A narrow irregular band of black on the under side of the abdomen; head rounded in front; a rather small species. Expands about 72 mm.....*davisi* (Smith & Grossbeck).

CC. Hind margin of pronotum or collar black or nearly so.

D. Central area of the abdomen beneath black.

Opercula long and with the legs usually somewhat chestnut colored; the uncus when seen in profile forked, resembling the open mouth of a snake. Expands about 95 mm.....*similaris* (Smith & Grossbeck).

Opercula much shorter, more rounded, and the black area on the under side of the abdomen in the nature of an even stripe. Uncus not forked. Expands about 95 mm.

lyricen (De Geer).

Blacker than typical *lyricen*, lacking the considerable amount of fulvous markings on the pronotum and mesonotum. A fulvous somewhat anchor-shaped mark centrally on the pronotum. Expands about 95 mm.

lyricen var. *engelhardti* (Davis).

DD. Central area of the abdomen not black beneath, often pruinose, as well as the long opercula. Collar black, often with a greenish spot each side near the outer angles. Expands about 95 mm.....*sayi* (Smith & Grossbeck).

BB. Uncus broad at the base, triangular in shape and generally about as broad as long. Opercula broad and rounded at the extremities; no black area on the central part of the abdomen beneath, usually unicolorous. Wings broad; hind margin of the pronotum or collar green or greenish; dorsal segments of the abdomen not margined with brown; in fresh specimens the basal segments pruinose, also the terminal segments, leaving the four middle segments black. A very large species expanding over 110 mm.

auletes (Germar).

44. Small species; uncus wish-bone shaped and first cross vein in the fore wings starting from about the middle of the first marginal cell. First and second cross vein of fore wings not clouded, wings clear throughout. Front of head rounded; collar greenish or yellowish, and contrasted in color rather sharply with brown and black of pronotum and mesonotum. Found near the coast. Expands about 70 mm.....*viridifascia* (Walker).

1. *Tibicen pruinosa* var. *winnemanna* (Davis).

Figured in JOURNAL, N. Y. Entomological Society, March, 1915, Pl. 2, fig. 4.

The specimens of *pruinosa* Say examined from Virginia have the dorsum of the abdomen more or less brown in color. Sometimes there is a conspicuous dorsal line of brown spots, one spot on each segment, while in other individuals the hind margin of each segment is edged with brown. They are without the transversely elongated and attenuated pruinose spot on the lateral base of the third segment, which with a black shining dorsum is characteristic of typical *pruinosa* of the general region of the valley of the Mississippi. The Virginia specimens belong to the variety of *pruinosa* described as *winnemanna* in the Bulletin of the Brooklyn Entomological Society for October, 1912, from fifteen individuals collected on Plummer's Island, Maryland.

This insect and *latifasciata* have a very peculiar song, differing considerably from the other native species. It has been described as a rising and falling note, and may be rendered *z-zape*, *z-zape*, *z-zape*. Sometimes the insect will hum along as if it were shut down to half strength, and will then break forth again into its *z-zape* song. It may be heard singing during the day, but it sings more particularly at evening, and an appropriate name for it would be the Evening Cicada. The writer has heard many of them singing along the Potomac River, also in Lynchburg, where on July 29 and 30, 1916, it was quite common in the back yards of the town, but seldom heard in the woods. In August, 1916, it was also heard in Richmond, one at evening in the grounds surrounding the governor's residence, and one in a back yard along East Main Street. Dr. Henry Fox sent me a female collected at Tappahannock, on the Rappahannock River, September 14, 1915. The insect is common at Wingina in Nelson County, also in places across the James River in Buckingham County. The Wingina records are as follows: August, 1913, male; July 11, 1915, male; August 22,

1915, female; August 8, 1916, male; August 16, 1916, male taken from the cicada-killing hornet, *Sphecius*; August 19, 1916, male. The foregoing were collected by Col. Robinson. In late July and the first days of August, 1916, the writer heard several *winnemanna* singing at Wingina, especially near evening, but failed to capture any. From July 11 to 19, 1917, the results were about the same, except that one was heard singing during the progress of a thunder storm. On June 18, 1919, a warm day, one was heard singing at evening close to the house. This was an early date. Later they became more common. From August 2 to 14, 1921, Col. Robinson and I made more of a business of collecting cicadas, not only finding many *winnemanna* pupæ on the trunks of trees at evening, but also securing several with the shotgun. In all we collected thirty-two specimens, twenty-four males and eight females, all from the trees about the house, for we found none and heard none in the regularly forested areas a short distance away.

2. *Tibicen pruinosa* var. *latifasciata* (Davis).

Figured in JOURNAL, N. Y. Entomological Society, March, 1915, Pl. 2, fig. 3.

The only Virginia record for this conspicuously beautiful insect is a male from Revel's Island, October 12, 1915 (W. L. McAtee), collection U. S. Biological Survey. Revel's Island is one of the chain of islands along the Eastern Shore of Virginia, a few islands south of Chincoteague.

The types and numerous paratypes came from Cape May County, New Jersey, and as it is also common in places and at times along the coast of North Carolina, it will no doubt be collected in considerable numbers in Virginia. The shining black tergum with the broad white stripe each side on segment three, readily separates this insect from *winnemanna*. The song of *latifasciata* is a *z-zape, z-zape, z-zape*, continued for a short time.

3. *Tibicen robinsoniana* new species. Pl. IV, figs. 1 and 2.

Type male and allotype female, Wingina, Nelson County, Virginia, August 3, 1921. Davis collection.

Resembles *Tibicen linnei*, and *Tibicen pruinosa* var. *winnemanna* of the same region; it also resembles *pruinosa* of the central United States west of the Allegheny Mountains. From *linnei* it differs in having the costal margin of the fore wings evenly curved instead of being bent at the end of the radial

cell; also in having the opercula more evenly rounded at the extremities instead of truncated obliquely as in that species. From *Tibicen winnemanna* it differs in being smaller, in having the opercula more evenly rounded at the extremities, the outer margins not as converging toward the extremities, and, as in *linnei*, not as obliquely truncated on the inner side. These differences also hold with reference to typical *pruinosa*, which differs further in lacking the shining black median band beneath on the abdomen, so sharply defined in *robinsoniana*.

Head with a broad black stripe between the eyes including the area of the ocelli; supra-antennal plates, and frontal triangular spot between the black transverse rugæ, green; antennæ black. The pronotum is black, with a central, oblong, triangular, green spot, each side of which are large irregular blotches of green or brownish-green; the hind margin of the collar is also green (fore margin partly black), the green extending to the sides, where it is usually interrupted by black close to the base of the fore wings. The mesonotum is marked with green or greenish-brown as in *linnei*, *pruinosa* var. *winnemanna*, and *pruinosa* var. *latifasciata*. The tergum is shining black resembling in this respect *linnei* and *pruinosa* var. *latifasciata*. There is no white stripe at the base of segment three, only a pruinose spot each side at the base of the abdomen, sometimes extended into a transverse pruinose line. There is a pruinose spot each side on the caudal segment, as in *linnei*, *pruinosa* and some other allied species. Beneath pruinose with the transverse rugæ black or brownish-black, and a well-defined, central, shining black stripe extending the length of the abdomen; valve also black, usually margined with pale along the upper edges. Legs greenish variegated with black; opercula pale. The venation of both pairs of wings is as in *linnei*; the first and second transverse veins of the fore wings are clouded; the first two or three marginal cells are slightly smoky and the membranes at the base of both pair of wings are dark gray, those of the hind wings edged with white. The female is colored as in the male, except that the basal pruinose spots of the abdomen may be absent.

MEASUREMENTS IN MILLIMETERS.

	Male Type.	Female Allotype.
Length of body.....	33	32
Width of head across eyes.....	13.5	13.5
Expanse of fore wings.....	90	90
Length of operculum.....	7	

In addition to the type and allotype the following thirty-four specimens were secured at Wingina, all of them collected with a shotgun: August 3, two males; August 4, ten males; August 7, eight males; August 8, one male; August 9, one male; August 12, six males; Au-

gust 13, one male; August 14, one female; August 15, two males; August 17, one male, and August 20, one male. Nearly all of these specimens were collected in the woods of mixed pines and oaks that occupies the gentle rising slope back of the museum at Wingina, though an occasional individual, as, for instance, the female paratype shot by Col. Robinson's brother, Mr. C. Cabell Robinson, found its way to the locusts and other trees surrounding the house itself. To the south, across the James River, in Buckingham County, we did not hear any *robinsoniana* at either Spear's or Willis's mountains, but we did hear a number in the wooded sections nearer to the river. To the north, in Nelson County, we heard *robinsoniana* in Johnson's Cove near Elmington, in the first line of the Blue Ridge Mountains, and at several places between there and the James River.

Lately Mr. W. S. Hough, of the State Crop Pest Commission, sent the writer a male of this species for examination, collected at Winchester, Frederick County, in the northern part of the state and on the westerly side of the Blue Ridge.

In habits *robinsoniana*, like *linnei*, sings mostly during the sunny hours, but its long-drawn-out slow *zape, zape, zape* continued for from one to two minutes is a very different performance from the more hurried *seger, seger, seger* of *linnei* continued for but a short time. The *z-zape* of *pruinosa* var. *winnemanna* is also a very different song and continued but a short time in comparison to *robinsoniana*. *Tibicen pruinosa* var. *latifasciata* sings like *winnemanna*, but it inhabits a belt along the coast, and has the broad pruinose stripes each side on segment three in the male, while the female usually has three stripes near the base of the abdomen, which will further distinguish it from *robinsoniana*. In the introduction to this paper comment has been made on the peculiar song of the species under consideration, and we wish to make it plain that it is very different from that of any of the other native species. All of the large-headed species (those having a simple uncus) have a much more rapid song of short duration. As has also been stated, we had no difficulty in separating by their songs the seven species of cicadas singing about Wingina, and most distinct of all was *robinsoniana*. It is indeed surprising that, on account of this character alone, the species did not long ago attract the attention of entomologists.

4. *Tibicen linnei* (Smith & Grossbeck).

Figured in JOURNAL, N. Y. Entomological Society, September-December, 1918, Pl. 7, fig. 1.

A species of wide distribution and quite common in Virginia. The following specimens have been examined: Mt. Vernon, September 5, 1920, female, in collection of A. N. Caudell; Alexandria County, August 29, 1910, male (Ernest Shoemaker); Spring Hill, Fairfax County, September 21, 1911, female (Davis); Black Pond, Fairfax County, September 7, 1914, male (W. D. Appel); Difficult Run, Fairfax County, August 31, 1916, male (E. A. Preble), U. S. Biological Survey; Falls Church, September 6, male, collection Nathan Banks; Winchester, Frederick County, August, 1921, W. S. Hough collection; Hot Springs, female (Col. Wirt Robinson); Hot Springs, August 14, 1916, male, flew to light at 10.30 P.M. (Morgan Hebard); Charlottesville, September 3, 1915, male (Dr. Henry Fox). Dr. Fox also collected the following series at Tappahannock in 1915: September 11, male; September 14, four males, two females; September 25, male; October 2, two females; October 4, female; October 6, female. In August, 1916, he collected at the same locality nine males and two females. Lynchburg, August 2, 1921, male, taken by the writer from the cicada-killer (*Sphecius*) as it was being brought to its nest. These large hornets had numerous burrows opposite the station of the Chesapeake and Ohio Railroad and close to the tracks. At that date also many male *Sphecius* were stationed near the burrows on various objects and gave chase to the females when they appeared. One of the males had his lookout on a piece of old leather lying on the ground, to which he always returned; one on a piece of brown paper, and still another on a large dead leaf. Others perched on bushes and other near-by plants.

From Wingina, Nelson County, we have, August 7, 1914, male, August 6, 1917, female, August 12, 1919, male, and August 19, 1919, male, all collected by Col. Robinson. In August, 1921, we heard many singing in the woods about Wingina; also at Johnson's Cove, northwest of Elmington, in the first line of the Blue Ridge Mountains on August 8. Across the James River in Buckingham County we heard a number at Spear's Mountain on August 5 and 6, and on the latter date found a dead male and female on a wood road near the James River. On August 9 we heard a number at Willis's Mountain, about

20 miles south of the river. On August 19, after a cold snap, Col. Robinson found ten specimens of *linnei* lying along a shady part of the road overhung by large trees between Spear's and Pluet's mountains. On August 16, 1921, the writer heard many singing at West Hampton, near Richmond.

This is one of the most forest-frequenting of the cicadas, but its presence may be known by its wavy song, which may be rendered *zegez, zeger, zeger*, of rather even tone and continued for a short time.

5. *Tibicen canicularis* (Harris).

Figured in JOURNAL, N. Y. Entomological Society, March, 1916, Pl. 3, fig. 2, and September–December, 1918, Pl. 7, fig. 2.

A dead male, without a head, was found on Bald Knob, Bath County, 3,900 feet, August 19, 1917, and kindly presented to the writer by Mr. Morgan Hebard, who states that it was found "in low scrubby oak forest bordering the bald." The specimen belongs to this species, as the uncus seen in profile is differently shaped than in *davisi*. (See Entomological News, April, 1907, Pl. 3.) This is a common species to the north in Pennsylvania, New Jersey, etc., but how far south it extends can be determined only by future collecting.

This insect has a piercing, high-pitched song, the shrill *zing* lasting but a short time. It is not loud, as the insect is small.

6. *Tibicen davisi* (Smith & Grossbeck).

Figured in JOURNAL, N. Y. Entomological Society, March, 1916, Pl. 3, fig. 3, and September–December, 1918, Pl. 7, fig. 3.

Tappahannock, September, 1915, two males, four females, October 4, 1915, male, and August, 1916, female (Dr. Henry Fox); Newport News, August 10, 1889, male, Otto Heidemann collection and labeled "*Cicada canicularis* Harris var. det. by Uhler"; Lynnhaven, October, 1917, three males, twelve females (A. H. Helme); West Hampton, near Richmond, August 17, 1921, female on trunk of pine and recently emerged. On the trunk of the same tree and elsewhere in the vicinity on pines there were a number of empty pupa skins of this species, but they were not as plentiful as in the same locality in August, 1916. In Nelson and Buckingham counties, what we have considered as *davisi* has been heard on several occasions singing in the pine woods. One was heard singing near Spear's Mountain as early as June 21 in 1919,

and several on Willis's Mountain on August 9, 1921. It is likely that in many places in Virginia this species and *canicularis* are to be found in the same territory as they are in Cape May County, New Jersey. Mr. Andrew N. Caudell has given the writer a female *davisi* collected September 10, 1921, at Point Lookout, Md., just across the Potomac River from the Virginia shore.

7. *Tibicen similaris* (Smith & Grossbeck).

Figured in JOURNAL, N. Y. Entomological Society, September-December, 1918, Pl. 8, fig. 2.

Arlington, male, collection U. S. Nat. Museum. This species is more common to the south of Virginia.

8. *Tibicen lyricen* (De Geer).

*Figured in JOURNAL, N. Y. Entomological Society, September-December, 1918, Pl. 8, fig. 1.

A species of wide distribution and quite common in Virginia. Inland and especially in the higher parts of the state the variety *engelhardti*, in which the pronotum and mesonotum are nearly all black, except for the anchor-shaped tawny spot on the former, is the prevailing form.

Of typical *lyricen* the following have been examined: Falls Church, August 30, female (Banks); Dunn Loring, July 26, 1915, female, collection University of Michigan; near Bluemont, September 3, 1916, two males (Francis Harper), these approach var. *engelhardti*; West Hampton, near Richmond, August 17, 1921, male found dead on road after cool night; Tappahannock, August 3, 1915, male, approaching var. *engelhardti*; September 10, 1915, male; July, 1916, four males, two females, and August, 1916, two males, one female, all from Dr. Henry Fox. Nelson County, July 31, 1917, female; August 1, 1917, female; August 6, 1917, female; August 4, 1921, male (Col. Robinson). August 5, 1921, we collected a single typical female *lyricen* on Spear's Mountain, Buckingham County, and later a typical female emerged from a pupa found at evening on the trunk of a tree in the garden at Wingina. On June 21, 1919, we heard a *lyricen* singing near Spear's Mountain. This is an early date.

Of variety *engelhardti* the following have been examined: Covington, 1,000 feet, August 17, 1916, female (Morgan Hebard); Hot Springs, 2,500 feet, August 31, 1916, male, taken from cicada-killing wasp (*Sphecius*) by Mr. Hebard; Winchester, Frederick County, July, 1921, male, W. S. Hough collection. The following have been collected in Nelson County by Colonel Wirt Robinson: July 17, 1912, male; July 18, 1912, female; August 9, 1914, female; August 19, 1915, male; August 5, 1916, female; August 10, 1916, male; August 12, 1916, female; July 30, 1917, female; July 31, 1917, female; August 6, 1917, female; August 19, 1919, female; July 25, 1920, female. In addition we dug four *engelhardti* and one typical *lyricen* from the burrows of the cicada-killer on August 6, 1916.

In 1921 the following were collected at Wingina: July 25, female; July 31, male; August 3, male; August 7, female; August 14, male and female; August 16, female; August 21, three females, and August 22, male. At Johnson's Cove, near Elmington, Nelson County, August 8, five females on low trees, principally small persimmons. In Buckingham County on August 5 we found the species very plentiful in a small area on Spear's Mountain, where four males and nine females were collected. Three pair were in copulation and by hitting the small trees on which they were, a smart crack with a club, the locked-together cicadas fell to the ground. On August 11 we heard a number of *lyricen* in that curious pile of rocks known as Willis's Mountain that rises suddenly to the height of 1,159 feet from a generally level country. On several occasions we found dead individuals on the roads. Still later Col. Robinson, on returning to Spear's Mountain, August 19, following some cool nights, found fifty-six cicadas lying on the road running through the gap, nearly all of them in the gap itself where the road was overhung by trees. Most of the cicadas were dead, but a few were living. The majority were *lyricen* var. *engelhardti*, with two or three typical *lyricen* among them, while ten were *Tibicen linnei*; no other species were found.

9. *Tibicen sayi* (Smith & Grossbeck).

Figured in Howard's Insect Book under the name of *tibicen*, Pl. 27, fig. 20.

This is a very common insect in Virginia and 184 specimens have

been examined from the state. It might well receive the name of the Morning Cicada, because the males usually commence singing early in the day before those of the several other associated species. The song is impetuous, the *zing* becoming very rapid, and then gradually subsiding. They are often found in the lowland and will oviposit in golden rods, dead branches of sumach, etc. In such situations they are probably much safer from the cicada-killer, *Sphecius speciosus*, which usually, when after cicadas, searches along the branches of trees and up and down their trunks. In Virginia this large species is sometimes called the "Horse Hornet."

Tibicen sayi has been heard singing near Washington as early as June 24, 1911. In the writer's collection there is a male received from Dr. Henry Fox, collected at Tappahannock, Essex County, October 2, 1915, and a male from Lynnhaven, Princess Anne County, October, 1917, from Mr. Arthur H. Helme. Many specimens have been examined from Alexandria and Fairfax counties near Washington; others from Fauquier County, at the foot of the Blue Ridge; Colonial Beach, Westmoreland County; Milford, Caroline County; Ocean View, near the mouth of the James River; Richmond, many in August, 1916, and again in August, 1921; Wingina and other near-by places in Nelson County; in Buckingham County, at Spear's Mountain and along the James River; also Lynchburg, Campbell County.

10. *Tibicen auletes* (Germar).

Figured in JOURNAL, N. Y. Entomological Society, March, 1915, Pl. I, fig. 1; Howard's Insect Book, under name of *marginata*, Pl. 28, fig. 19.

This species and *Tibicen resonans* recorded from North Carolina and southward, but which may yet be found in Virginia, are the largest cicadas found in the eastern United States. *Auletes* ranges farther north than *resonans* and is found in Massachusetts. It is the ventriloquist among our cicadas, and in spite of its large size is often difficult to locate in the tree where it is singing, for the even-toned song, which is not loud considering the size of the insect, seems to come from several directions. While it sings during the sunny hours of the day, it is most active toward evening, and at twilight many individuals may sometimes be seen flying from tree to tree. This

species is more protectively colored than some of the others, and it often blends admirably with the gray bark of certain trees. In the northern part of its range it appears to prefer dry or sandy situations, but it is probably present in most parts of Virginia.

The state records so far secured are as follows: Four Mile Run, Alexandria County, September 1, 1913, male (A. Wetmore), U. S. Biological Survey; Virisco, Fairfax County, August 26, 1914, female (C. R. Shoemaker); Tappahannock, August, 1916, male and three females (Dr. Henry Fox); Dulinsville, Madison County, female, no date, U. S. Nat. Museum; Nelson County, August 3, 1912, male; July 8, 1914, female, and August 9, 1914, male (Col. Wirt Robinson); Richmond, August 24, 1907, female (B. M. Shepherd), U. S. Nat. Museum; August 9, 1916, male, found dead at West Hampton, near Richmond; Warwick County, August, 1911, male (H. H. Bailey), U. S. Nat. Museum; Fortress Monroe, August 10, 1916, male just emerged from pupa skin; Lynnhaven, Princess Anne County, September 30, 1917, female (A. H. Helme).

From August 2 to 14, 1921, we found four males and one female at Wingina, Nelson County, and about the trunks of some of the oaks, both of the white and black oak group, the cast pupa shells were in great abundance. One of the males mentioned above had just emerged from the pupa skin on the morning of August 3, and we found it hanging on a low limb of a tree. Later, after a severe rain and wind storm of the early afternoon, we returned to look for the cicada. As expected, it had climbed high up the tree. The writer climbed after it, and when touched it squirted forth the liquid that recently matured insects possess in abundance. The following day, in the afternoon, we found a second pupa about to split up the back. We carried it home and the insect emerged on the window screen in the museum. The individuals of this species seem much more likely to emerge from the pupæ during the sunny part of the day than those of any other of our native cicadas. Across the James River we heard *auletes* singing near Spear's Mountain on August 5; near Willis's Mountain on August 9 and near the river on August 11 we found *auletes*, *lyricen* and *sayi* lying dead. At West Hampton, near Richmond, on August 16, I heard a few *auletes* singing.

11. *Tibicen viridifascia* (Walker).*Cicada reperta* Uhler.

Figured in JOURNAL, N. Y. Entomological Society, March, 1916, Pl. 6, fig. 1.

The synonymy given above was suggested in this JOURNAL for March, 1916, and December, 1917. Lately it has been confirmed by Mr. W. L. Distant, who compared specimens of *viridifascia* and *resonans* sent from North Carolina in 1920 by Prof. Z. P. Metcalf with Walker's types in the British Museum and found them "identical."

A male of this species was shot with a bean shooter in a small linden tree at Ft. Monroe, Old Point Comfort, August 10, 1916, and a number of others were heard singing in the higher trees as well as in the scrub near the shore. Mr. H. A. Allard has sent me a male from Virginia, collected July 31, 1921, in some small pines on Cape Henry not far from the old lighthouse. At that time they were common, as they often are along the coast to the south of Virginia.

This is the first species mentioned in the present list that has the uncus wish-bone shaped, and as in others having this character, the song is continuous; its *zeekie, zeekie, zeekie* may continue for a long time.

12. *Cicada hieroglyphica* Say.

Figured in JOURNAL, N. Y. Entomological Society, March, 1916, Pl. 6, fig. 5, and Howard's Insect Book, Pl. 28, fig. 11.

Fairfax County, near Washington, June 24, 1920, female (Alan S. Nicolay); Great Falls, Fairfax County, June 27, male, collection Nathan Banks. Also found on the Maryland side of the Great Falls of the Potomac. This species is no doubt common at times in many parts of Virginia. It appears earlier than most of the species belonging to the genus *Tibicen*; is often found among pines, and has a rather shrill song, which is not long continued, and resembles somewhat that of *Tibicen canicularis*.

13. *Tibicina septendecim* (Linnæus).

Figured in Howard's Insect Book, Pl. 27, fig. 16.

According to Bulletin No. 71, U. S. Dept. of Agriculture, Bureau of Entomology, 1907, C. L. Marlatt, nine broods of the 17-year race of the Periodical Cicada and two broods of the 13-year race (one of them doubtfully) are recorded in Virginia. Associated with these is

the variety *cassinii* (Fisher), smaller than the typical form, and with the lower surface of the abdomen usually much darker in color.

SEVENTEEN-YEAR RACE.

Brood I (1910-1927); fairly well distributed over the state, except in the central portion.

Brood II (1911-1928); recorded from a broad belt across the central part of the state from north to south. On June 29, 1911, Mr. Wm. D. Appel and the writer observed colonies of this brood at Mt. Vernon, Dyke, Arlington and Cherrydale. They were strictly in colonies as stated. At Dyke we heard but five males singing on the hill that we visited, and we quickly walked out of the area where the insects had been numerous a few days before. The leaves had been burned off of the ground some time in the late spring and showed plainly many of the cones that had been erected by the pupæ at an earlier date, when the dead leaves lay as a mat in the woods.

Brood V (1914-1931); recorded only from Augusta, Caroline, Highland(?) and Shenandoah counties.

Brood VI (1915-1932); recorded from Charlotte, Chesterfield, Fairfax, Powhatan and Prince Edward counties.

Brood IX (1918-1935); from the southern part of West Virginia across Virginia into North Carolina. The following specimens of this brood have been examined: Great Falls, May 23, 1918, female (E. A. Chapin), and male of variety *cassinii* from same locality, May 28, 1918 (W. L. McAtee), both specimens in collection, U. S. Biological Survey.

Brood X (1919-1936); particularly in the northeastern and southwestern portions of the state.

Brood XIII (1922-1939); "a few individuals were reported from two counties in Maryland in 1905, and two very doubtful records (1888) have been found for Kentucky and Virginia."

Brood XIV (1923-1940); reported from Alexandria, Augusta, Buchanan, Dickerson, Fairfax, Frederick, Lee, Nelson, Tazewell and Wise counties.

Brood XVII (1909-1926); reported from Albemarle, Appomattox, Prince William and Washington counties.

THIRTEEN-YEAR RACE.

Brood XIX (1920-1933); reported from Brunswick, Halifax, Hanover and Prince George counties.

In the bulletin of 1907 it was stated that Brood XX was of doubtful occurrence in Wise County. In a recent letter Dr. Marlatt reports that after an examination of the old records he concludes that this brood really does not exist in Virginia, but, on the other hand, the occurrence of Brood XIX in the costal plain of the state seems to be well substantiated.

14. *Melampsalta calliope* (Walker).

Cicada parvula Say.

Figured in JOURNAL, N. Y. Entomological Society, June, 1920, Pl. 5, figs. 14 and 15; Howard's Insect Book, Pl. 28, fig. 8.

Fairfax County, opposite Plummer's Island in the Potomac, August 9, 1915, female, collected by Mr. H. S. Barber while looking for insects at night. Oak Grove, Loudoun County, July 13, 1920, male, in collection of Mr. Louis A. Stearns, who writes: "The electric train was stopped at the Oak Grove station, when the specimen, which I am forwarding to you, came in the open window and alighted on my coat sleeve."

EXPLANATION OF PLATE IV.

Fig. 1. *Tibicen robinsoniana* Davis. Type.

Fig. 2. *Tibicen robinsoniana* Davis. Enlarged.

Fig. 3. *Tibicen linnei* (Smith & Grossbeck). Cotype.

Fig. 4. *Tibicen pruinosa* (Say). Enlarged.

A REVIEW OF THE GENUS *PÆCILONOTA* AS
FOUND IN AMERICA NORTH OF MEXICO (COLE-
OPTERA, FAMILY BUPRESTIDÆ) WITH DE-
SCRIPTIONS OF NEW SPECIES.

By W. J. CHAMBERLIN,

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The genus *Pæcilonota* was erected by Eschscholtz¹ in 1829.

The species are closely related to those of the genus *Dicerca*, but may be separated at once by the broad scutellum.

¹ Friedrich Eschscholtz, Zoologische Atlas I, Berlin, 1829, page 9.